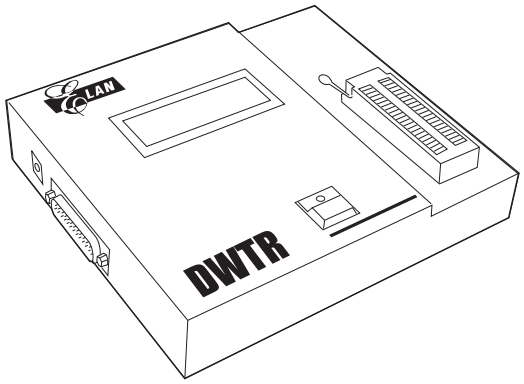
DWTR/FWTR

for EM78P Series

Operation Handbook

(Applicable to DWriter Driver Version 8.2 & later)

Doc. Version 1.0



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October 2007

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Handbook Revision History		
Doc. Version	**Revision Description**	**Date**
1.0	Operation Handbook initial version	2007/10/18

Chapter 1 Introduction

1.1 Overview

This handbook covers a concise operating guide for ELAN's DWTR/FWTR Writer Systems. The same basic writer hardware (indicated by "DWTR" marking) is used to accommodate the DWTR function mode for OTP programming and FWTR function mode for FLASH programming.

The DWTR function mode of the Writer is used for programming of industrial and commercial grade OTP chips. The DWTR functions in industrial- grade chip writer mode when firmware chip labeled "8K Industrial" is installed at the firmware socket underneath the writer. Likewise, it functions in commercial-grade chip writer mode when firmware chip labeled "8K Commercial" is installed. The corresponding DWriter Driver software can be downloaded from ELAN'S Website (see Appendix D for the applicable "8K Industrial" and "8K Commercial" chips).

The FWTR version of the Writer is mainly used for programming ELAN's EM78F651N and EMF652N FLASH chips. The Writer functions in FWTR writer mode when firmware chip labeled "FWTR2.0" is installed at the underneath the FWTR. Its corresponding FWriter Driver software can also be downloaded from ELAN'S website.

NOTE

Visit the ELAN website //www.emc.com.tw to download the latest DWriter or FWriter System Driver software.

On-line and off-line programming operations are common to both DWTR and FWTR modes. Their respective LCM display and operations in programming rolling code are also the same.

1.2 Writer Hardware Front Panel Attributes

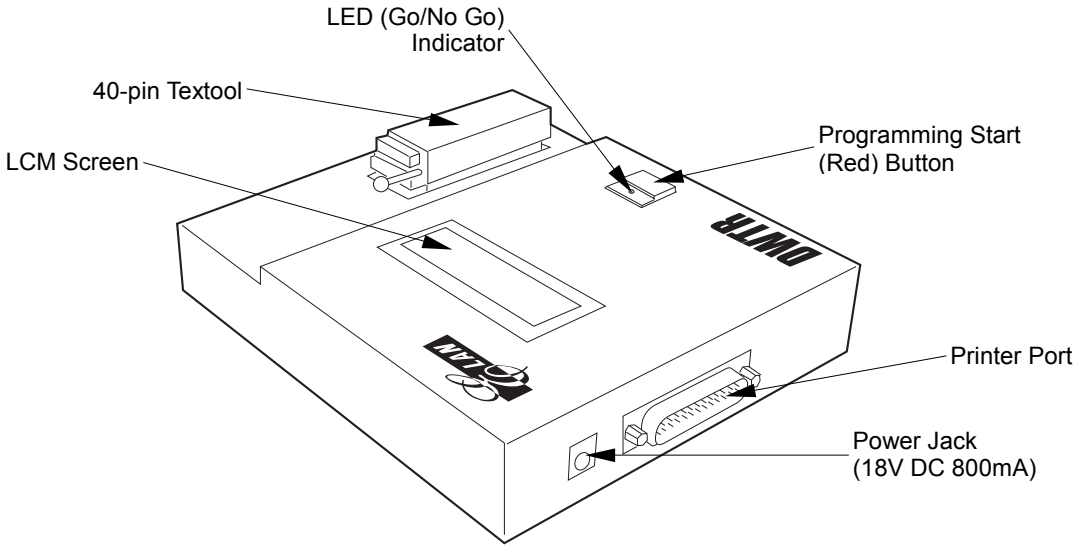


Fig. 1-1 DWTR/FWTR Assembly (Top View)

1.2.1 LCM

The LCM display turns on as soon as power is supplied to the DWTR/FWTR Assembly.

1.2.1.1 LCM General Functions Display Mode

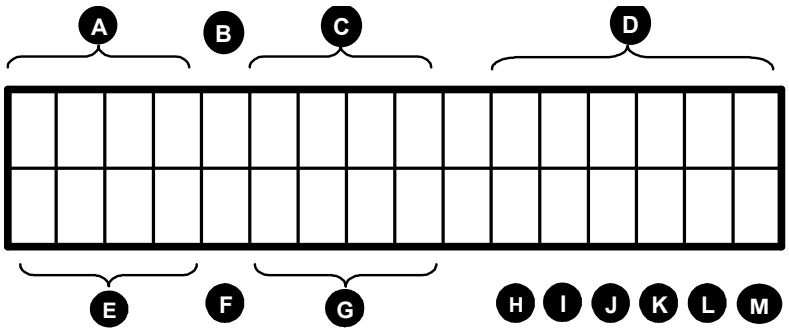


Fig. 1-2 LCM Display under General Function

A) EEPROM Checksum

B) Number of EEPROM Code Option word

C) EEPROM Code Option

D) ELAN logo or IRC Frequency

When the IRC function of target IC is enabled, the detected frequency will be displayed as programming is being performed (the display will last for 1 second during on-line operation mode, but will remain on display during off-line operation mode until programming of the next IC). Otherwise, ELAN logo will display.

NOTE

- *When programming under Internal RC mode, the internal frequency drift will vary depending on target IC type in use (see Appendix A, Section A2 for more details).*
- *If this area of the LCM shows "**.....**" message, it indicates that the internal frequency is outside of the guaranteed range.*

E) OTP/FLASH Checksum

F) OTP/FLASH Code Option word number

G) OTP/FLASH Code Option

H) OTP Read/Programming result

Read**:** Display "**O**" if reading is successful. If failed, display "**X**"
Program**:** If IC is not blank, display "**#.**" Display "**O**" if programming is successful. If failed, display "**X**"

I) EEPROM Read/Loading result

Display "O" if reading/loading is successful. If failed, display "**X**"

J) Jumper connection test

Display "O" if the connection between jumper and OTP/FLASH chip is OK. If failed, display "**X**"

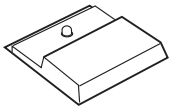
K) Textool (socket) connection test

Display "**O**" if the connection between Textool and OTP/FLASH chip is OK. If failed (i.e., no chip installed or Textool lever in open position), display "**X**"

L) Current detector

M) Voltage detector

1.2.1.2 Programming Counter Display Mode



Under off-line programming, when you press and hold the red button for over 3 seconds, the LCM will switch into Programming Counter display mode for five seconds to show the following information from the left section (6 digits maximum) of the LCM**:**

- Total number of programming attempts since last power-on or /RESET.
- Total number of successful programming since last power-on or /RESET.

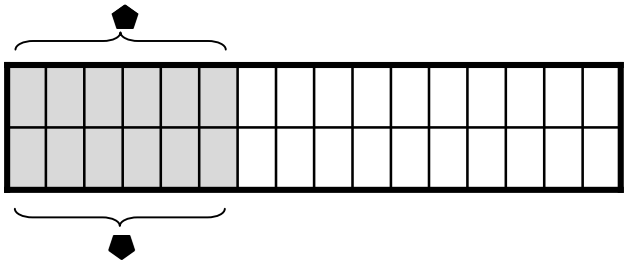


Fig. 1-3 LCM Display Section under Programming Counter Function

When the red button is released, the LCM returns to the General Function display mode.

1.2.1.3 Programming with Rolling Code Display Mode

FWTR and DWTR Assembly version “5K” and later, feature programming with rolling code function. When programming with rolling code, the top and bottom rows of the LCM left section (4 digits maximum) will display the OTP/FLASh Checksum, while the top and bottom rows of the LCM right section (6 digits maximum) will display the rolling code for the next chip to be programmed.

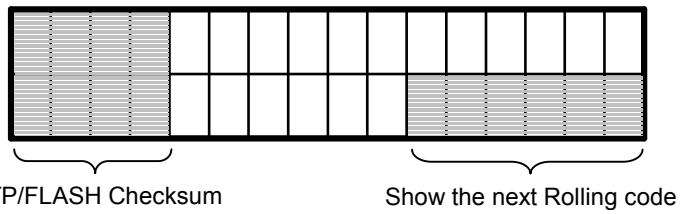
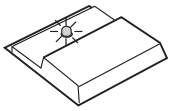


Fig. 1-4 LCM Display Section under R1olling Code Function

1.2.2 Push Button and its LED Indicator



Press button to start the stand-alone programming operation.

The amber LED indicator on top of the red push-button will indicate the following information**:**

- **Stays on:** programming in progress. Wait for the LED to turn off
- **Off:** programming OK, reading OK, loading OK
- **Very slow blinking (1.5 cycles per second):** programming failed
- **Slow blinking (2.5 cycle per second):** OTP chip not in socket
- **Fast blinking (5 cycles per second):** programming buffer (EEPROM) reading failed

1.2.3 Textool (Socket)

The Textool can accommodate various sizes of DIP packaged OTP/FLASH chips. When mounting a 40-pin chip into Textool, make sure that the chip is positioned in such a way that its notch (Pin 1) is on top (pointing toward the textool locking lever). If the OTP /FLASH chip has less than 40 pins, the chip should be installed bottom aligned with the Textool as illustrated at right.

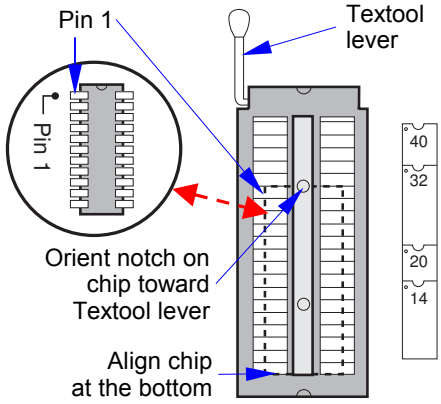


Figure 1-5 Mounting Chip into Textool

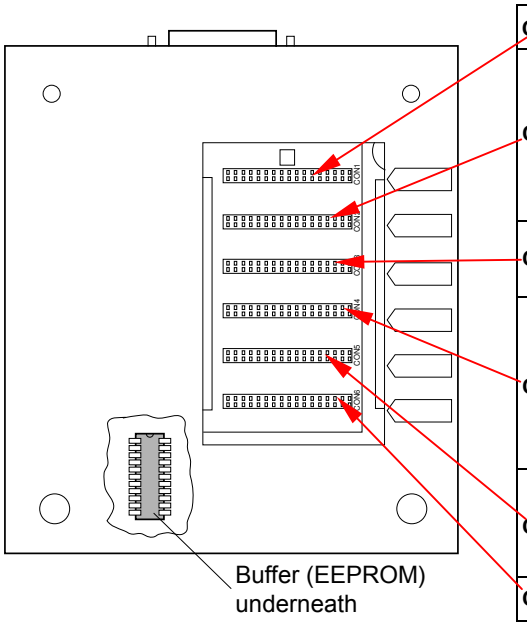
This position ensures that the pin numbers of both chip and the Textool are matched. Otherwise, the DWTR/FWTR Writer will not function properly.

Refer to Section 2.2.2, *Mounting Target IC on DWTR;* for OTP/FLASH chips which can be directly mounted into the DWTR/FWTR Textool and for the ones that needs additional adapters before they can be mounted into the Textool.

1.3 Writer Hardware Bottom Panel Attributes

1.3.1 The Jumper Connectors

Six jumper connectors are provided at the bottom of the DWTR/FWTR Assembly. Of these, only the first 5 connectors are currently applicable. The pertinent connector must be short-jumped to accommodate and match with the target chip being programmed as indicated in the figure below.



CON1	EM78P152S* EM78P153E* EM78P153S*
CON2	EM78P154N* EM78P155N* EM78P156E EM78P156N EM78P157N EM78P159N* EM78P256N* EM78P257 EM78P258N* EM78P259N* EM78P260N* EM78P340N* EM78P341N* EM78P342N* EM78P343N* EM78F651N** EM78P652N**
CON3	EM78P451 EM78P451S EM78P468N EM78P468L
CON4	EM78P211N* EM78P212N* EM78P221N* EM78P222N* EM78P311N EM78P312N EM78P330N* EM78P331N* EM78P447S EM78P447N EM78P510N EM78P5840 EM78P5840N* EM78P5841 EM78P5841N* EM78P5842 EM78P5842N* EM78P809N
CON5	EM78P345N* EM78P346N* EM78P347N* EM78P417N* EM78P418N* EM78P419N* EM78P458 EM78P459
CON6	Spare, for future use

**These OTP chips require IRC frequency setting (see Appendix A for details)*

*** FLASH chips*

Fig. 1-6 DWTR/FWTR Showing Proper Jumper Connectors for Relevant OTP/FLASH Chips

NOTE

- *Supported ELAN EM78P series OTP/FLASH chips are as listed above. Ignore the obsolete EM78P series model numbers listed on the DWTR board (if any).*
- *The above list arranges the chips according to their relevant DWTR/FWTR programming jumper position*

1.3.2 The DWTR/FWTR Bottom Board Major Components

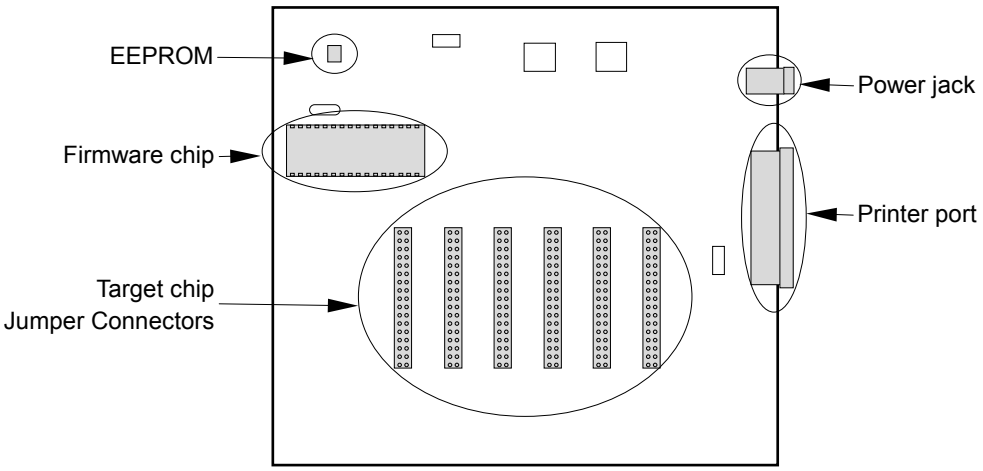
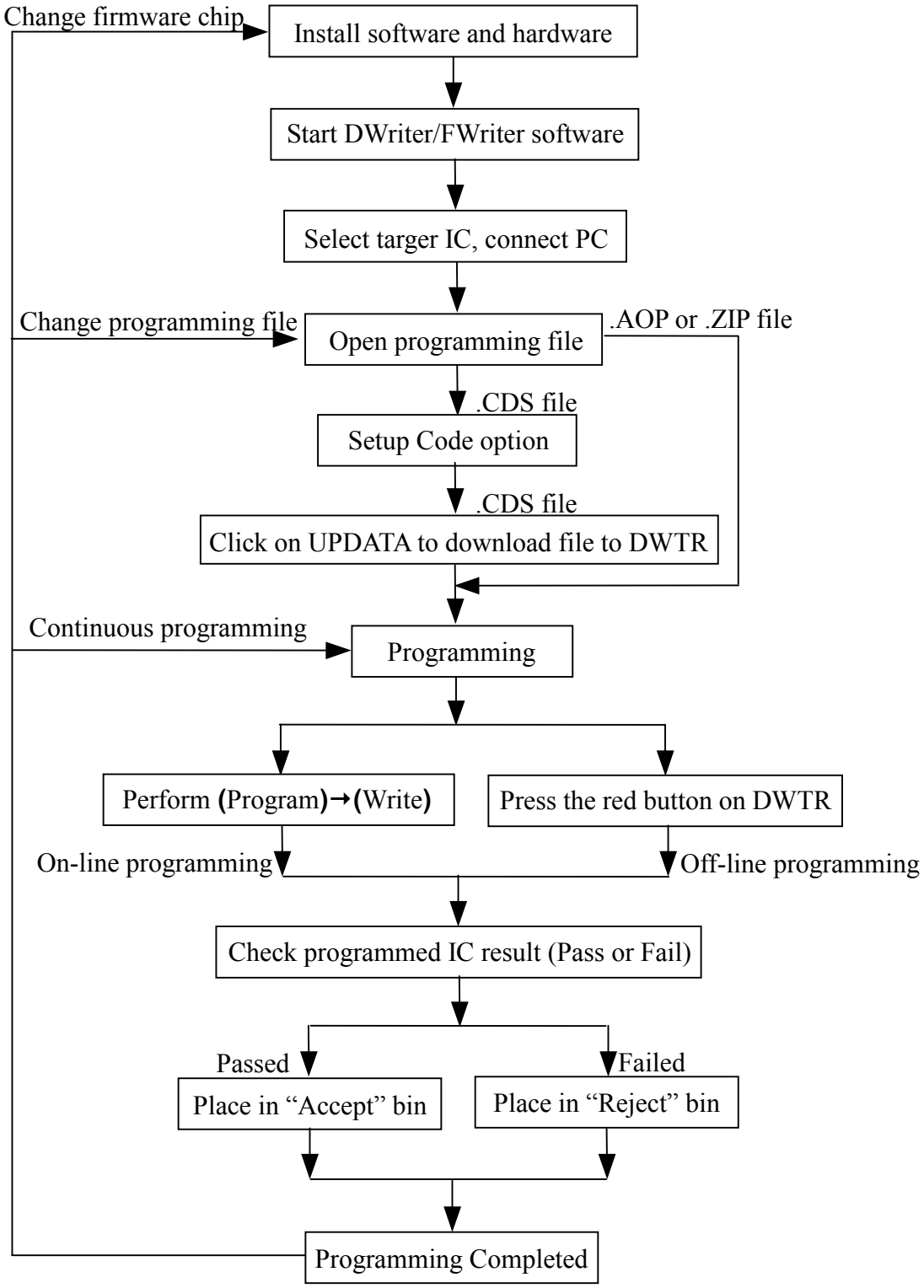


Fig. 1-7 DWTR/FWTR Bottom Board

1.4 Programming Operation Flowchart

NOTE
It would be helpful to print this page and use it as ready reference while programming



Chapter 2
System Installation

2.1 System Requirements

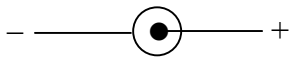
2.1.1 Host Computer

The DWTR/FWTR Writer System requires a host that meets the following configuration**:**

1. IBM PC or compatible computer (Pentium 100 or greater recommended)
2. Runs under WIN2000, WinNT, or WinXP
3. 10MB free hard disk space and 16MB RAM
4. Mouse is optional but highly recommended

2.1.2 External Power Source

Requires power source of +18.0VDC , 800mA (power adapter) to provide power for Writer Main Board.



NOTE
Use of ELAN provided AC power adapter is recommended.

2.1.3 Printer Port Cable

Standard 25-pin with DB-25 male connector at one end and DB-25 female connector at the other end. Length of cable should not exceed two meters (6.6 feet).

NOTE
- *If you have never installed the DWriter/FWriter Driver software before, you should install the printer port driving program **Port95nt.exe** (included in the software package) first before continuing to install the main software.*
- *Use of ELAN provided printer cable is highly recommended.*

2.2 Harware Installation and Setup

2.2.1 Connecting Main Board to Host Computer and Power Source

CAUTION!

1. *As a safety precaution, connect the printer cable first, then the power connector.*
2. *Be sure the Textool is empty before supplying power to DWTR/FWTR. Otherwise, the OTP chip could be damaged.*

1. Plug the DB-25 male connector of the printer cable to the DWTR/FWTR Assembly and the female connector to the printer port of your host computer.

2. Plug the power jack of the power adapter to the DWTR/FWTR power connector and plug the adapter to a power source. The DWTR/FWTR will perform a self diagnostic for a few seconds after the power is supplied.

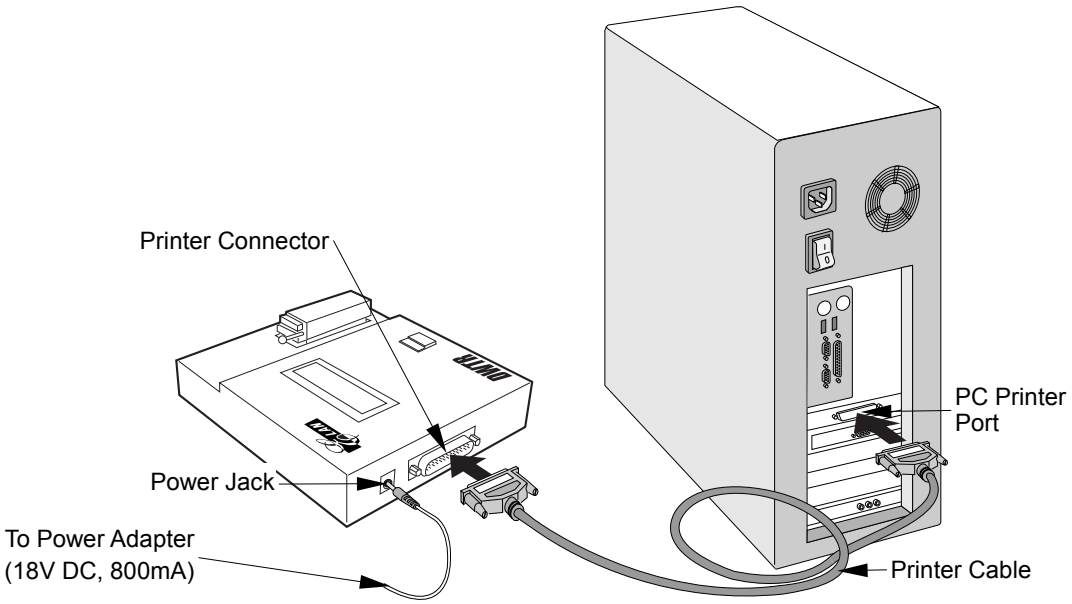


Fig. 2-1 Connecting DWTR/FWTR Assembly to Host Computer

2.2.2 Mounting Target IC on DWTR/FWTR Assembly

2.2.2.1 DIP Type OTP ICs which can be Directly Mounted on Existing Textool

EM78P153E	EM78P153S	EM78P156E	EM78P157N	EM78P159N
EM78P257	EM78P259N	EM78P260N	EM78P447S	EM78P451
EM78P451S	EM78P458	EM78P459		

2.2.2.2 DIP Type OTP/FLASH ICs Requiring DIP PCB Adapters

The following ICs require a DIP PCB adapter before they can be mounted on the DWTR/FWTR Writer.

EM78P152S	EM78P154N	EM78P155N	EM78P211N	EM78P212N
EM78P221N	EM78P222N	EM78P256N	EM78P258N	EM78311N
EM78312N	EM78P330N	EM78P331N	EM78340N	EM78P341N
EM78P342N	EM78343N	EM78P345N	EM78346N	EM78347N
EM78P417N	EM78 418N	EM78419N	EM78P5840	EM78P5840N
EM78P5841	EM78P5841N	EM78P5842	EM78P5842N	EM78P447NC
EM78P447ND	EM78P468L	EM78P468N	EM78P510N	EM78P809N
EM78F651N*	EM78F652N[1]			

Each of these ICs is equipped with their own individual DIP PCB adapter. The adapter can be mounted piggy-back on top of the existing DWTR/FWTR Textool. However, you can also remove the existing Textool and plug the adapter into its place (i.e., directly to the connector on the DWTR/FWTR board as illustrated below).

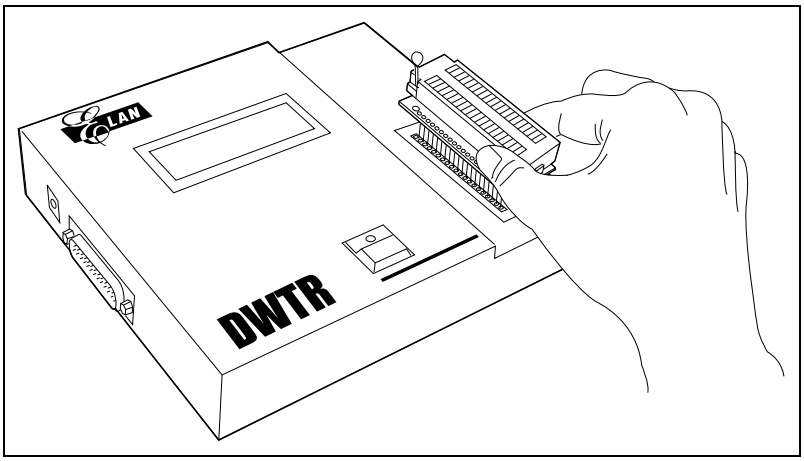


Fig. 2-2 Plugging DIP PCB Adapter Directly into DWTR//FWTR Board Textool Connector

[1] FLASH chips

2.2.2.3 QFP Type OTP ICs Requiring Unique QFP to DIP PCB Adapter

Each of the following QFP type ICs require a unique QFP to DIP PCB adapter before they can be mounted on the DWTR Writer.

EM78P468NQ EM78P468NAQ EM78P468NBQ EM78P468NCQ
EM78P510NQ EM78P510NAQ EM78P510NBQ

The adapter can be mounted piggy-back on top of the existing DWTR Textool. However, you can also remove the existing DWTR Textool and plug the adapter into its place (i.e., directly to the connector on the DWTR board as illustrated above).

2.3 DWriter/FWriter System Driver Installation

NOTE

- *If this is your first time to install DWriter/FWriter Driver software into your PC, you should install the printer port driver program **Port95nt.exe** first, and then install the software. The printer port driver is also available from ELAN website.*
- *If you have installed an old version software and need to update it, it is highly recommended that you remove the old version software first (by clicking on the **Remove** button of the uninstall program provided in your existing DWriter/FWriter Driver software) before installing the new software version.*

2.3.1 Installing/Downloading DWriter from ELAN Website

The latest version of the DWriter System software is available from the ELAN's website (www.emc.com.tw) under **Products** button.

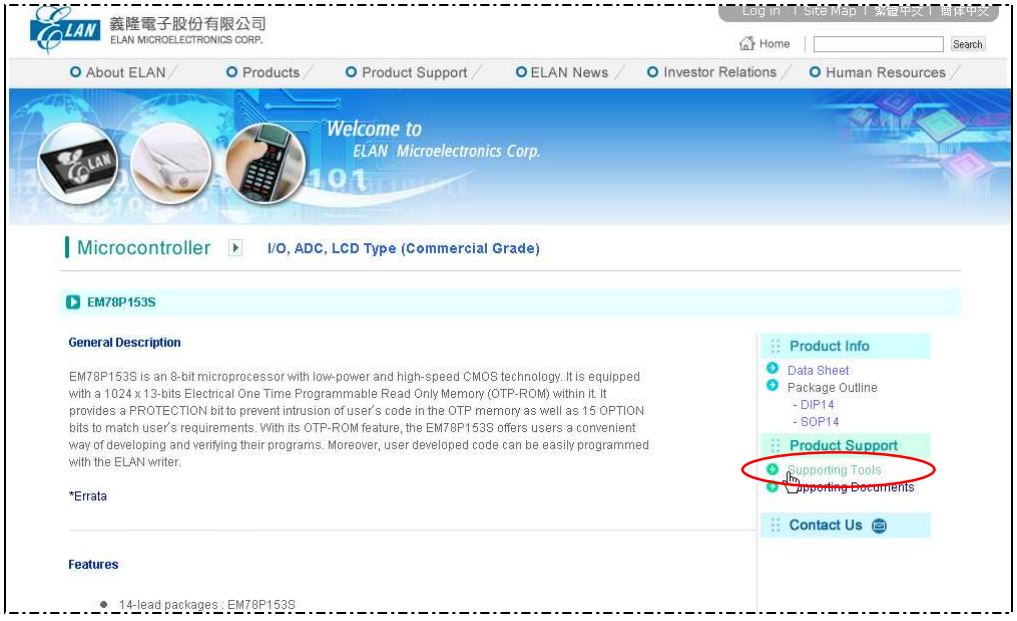
From ELAN homepage, click **Microcontoller Line**. From the resulting sub-menu, select the description which best suites the type of OTP IC you are currently working ("I/O, ADC, LCD Type (Commercial Grade)" is selected in this example).

Figure 2-3a ELAN Website Homepage with "Product" Button → "Microcontroller" Selected

Then from the “I/O, ADC, LCD Type (Commercial Grade)” list of ICs, select and click the particular IC part number you are working with (“EM78P153S” is selected in this example).

Figure 2-3b Accessing a Particular IC Type

When the following page displays, click “Supporting Tools” from right column of the page.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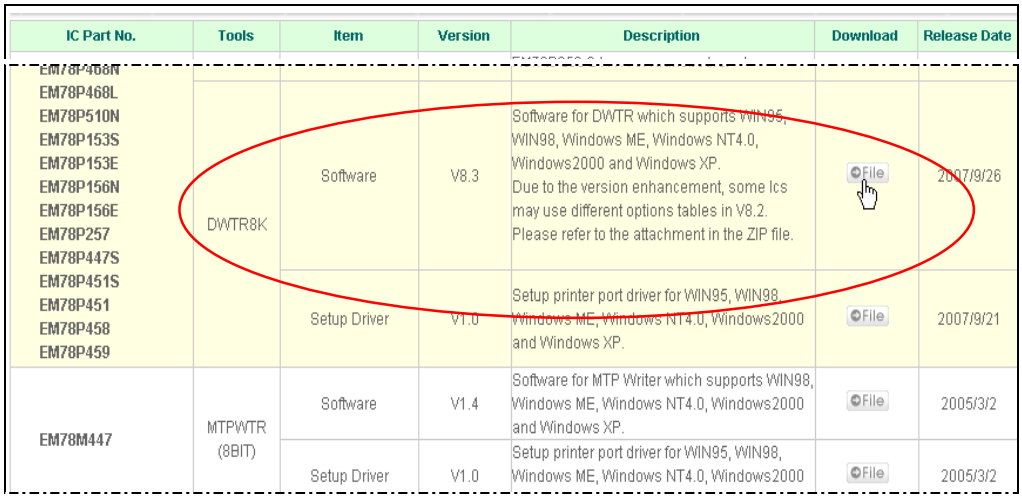
Welcome to
ELAN Microelectronics Corp.
Microcontroller
I/O, ADC, LCD Type (Commercial Grade)
EM78P153S
General Description
EM78P153S is an 8-bit microprocessor with low-power and high-speed CMOS technology. It is equipped with a 1024 x 13-bits Electrical One Time Programmable Read Only Memory (OTP-ROM) within it. It provides a PROTECTION bit to prevent intrusion of user's code in the OTP memory as well as 15 OPTION bits to match user's requirements. With its OTP-ROM feature, the EM78P153S offers users a convenient way of developing and verifying their programs. Moreover, user developed code can be easily programmed with the ELAN writer.
*Errata
Features
14-lead packages : EM78P153S
Product Info
Data Sheet
Package Outline
- DIP14
- SOP14
Product Support
Supporting Tools
Contact Us

Figure 2-3c Accessing DWriter Tool under “Supporting Tool”

From the ensuing display, look for "DWTR8K" under **Tools** column. Then click, **File** button from the **Download** column as illustrated below.



IC Part No.	Tools	Item	Version	Description	Download	Release Date
EM78P468L EM78P510N EM78P153S EM78P153E EM78P156N EM78P156E EM78P257 EM78P447S EM78P451S EM78P451 EM78P458 EM78P459	DWTR8K	Software	V8.3	Software for DWTR which supports WIN95, WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP. Due to the version enhancement, some Ics may use different options tables in V8.2. Please refer to the attachment in the ZIP file.	File	2007/9/26
		Setup Driver	V1.0	Setup printer port driver for WIN95, WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP.	File	2007/9/21
EM78M447	MTPWTR (8BIT)	Software	V1.4	Software for MTP Writer which supports WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP.	File	2005/3/2
		Setup Driver	V1.0	Setup printer port driver for WIN95, WIN98, Windows ME, Windows NT4.0, Windows2000	File	2005/3/2

Figure 2-3d Accessing DWriter Driver by Clicking the "File" Button

You will then be prompt to either open the "DWriter.exe" file and directly install the software on-line or save the file into your computer and install the driver locally.

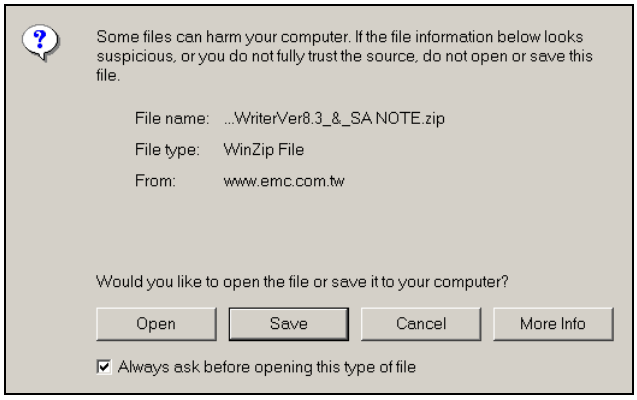

Some files can harm your computer. If the file information below looks suspicious, or you do not fully trust the source, do not open or save this file.
File name: ...WriterVer8.3_&_SA NOTE.zip
File type: WinZip File
From: www.emc.com.tw
Would you like to open the file or save it to your computer?
Open
Save
Cancel
More Info
Always ask before opening this type of file

Figure 2-3e DWriter Installation Option Dialog

When the dialog at right appears, follow the instruction of the installer until the final dialog displays.

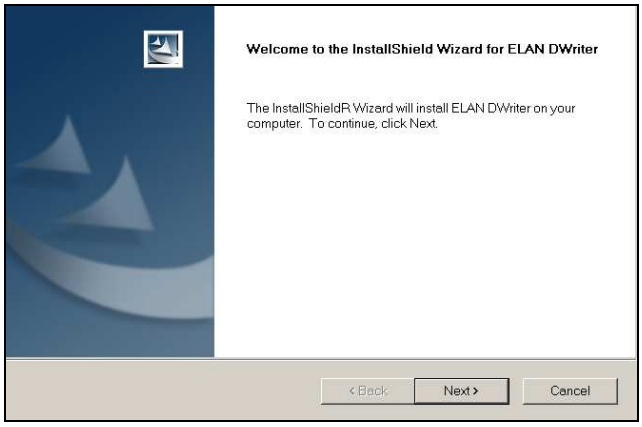

Welcome to the InstallShield Wizard for ELAN DWriter
The InstallShield® Wizard will install ELAN DWriter on your computer. To continue, click Next.
< Back
Next >
Cancel

Figure 2-3f DWriter Installation Process Welcoming Dialog

Note that at this stage, the host computer needs to reboot to complete the installation. If you choose to restart later, the message at right will appear.

Figure 2-3g DWriter System Driver Incomplete Installation Reminder

2.3.2 Installing/Downloading FWriter from ELAN Website

The latest version of the FWriter System software is available from the ELAN's website (www.emc.com.tw) under **Products** button.

From ELAN homepage, click **Microcontoller Line**. From the resulting sub-menu, select "I/O Type (Industrial Grade)."

Figure 2-4a Selecting "I/O Type (Industrial Grade)" for FLASH Type Target IC

Then from the "I/O Type (Industrial Grade)" list of ICs, select and click EM78P651N."

Figure 2-4b Accessing "EM78F651" for FLASH Supporting Tool

When the following page displays, click “Supporting Tools” from right column of the page.

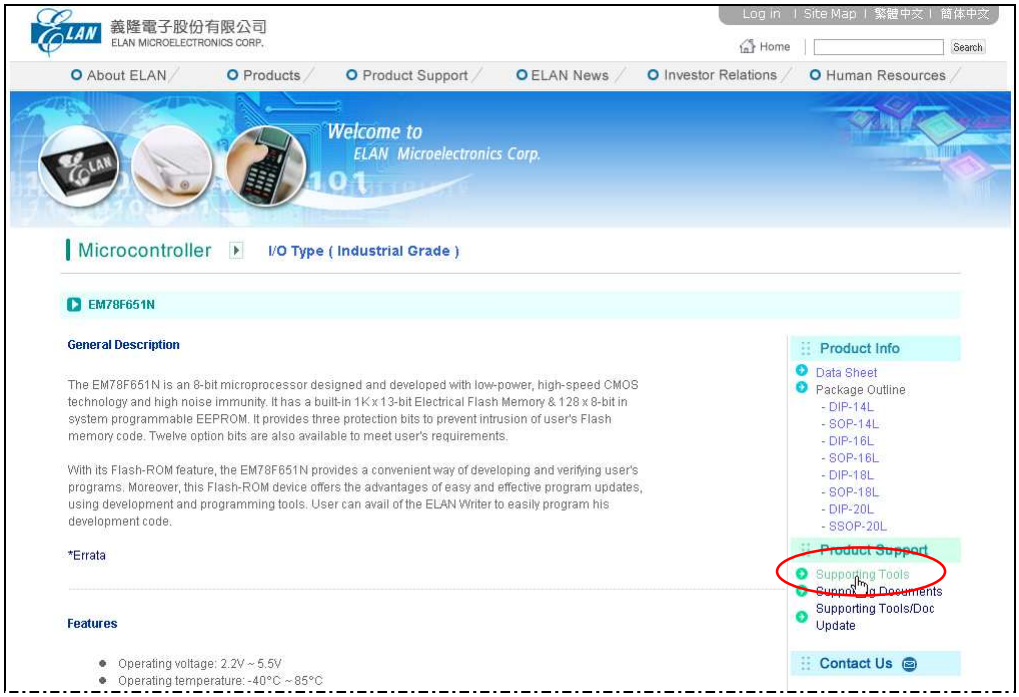
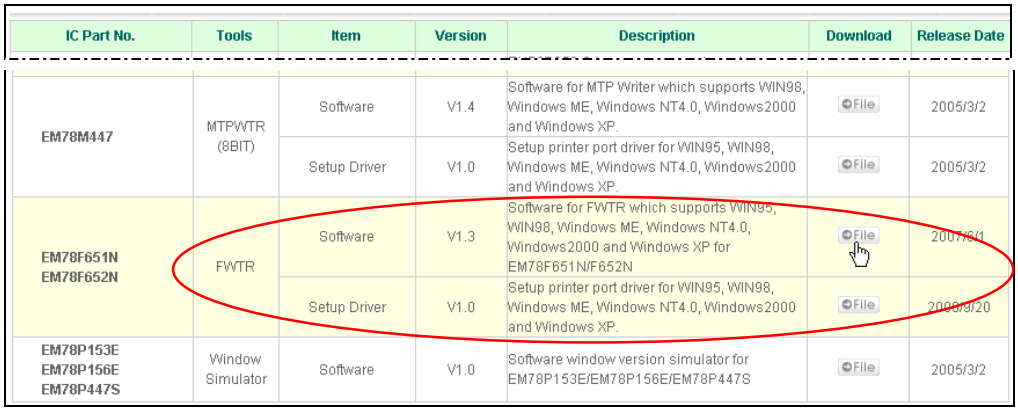

義隆電子股份有限公司
ELAN MICROELECTRONICS CORP.
Log in | Site Map | 繁體中文 | 簡体中文
Home
Search
About ELAN
Products
Product Support
ELAN News
Investor Relations
Human Resources
Welcome to
ELAN Microelectronics Corp.
Microcontroller
I/O Type (Industrial Grade)
EM78F651N
General Description
The EM78F651N is an 8-bit microprocessor designed and developed with low-power, high-speed CMOS technology and high noise immunity. It has a built-in 1K x 13-bit Electrical Flash Memory & 128 x 8-bit in system programmable EEPROM. It provides three protection bits to prevent intrusion of user's Flash memory code. Twelve option bits are also available to meet user's requirements.
With its Flash-ROM feature, the EM78F651N provides a convenient way of developing and verifying user's programs. Moreover, this Flash-ROM device offers the advantages of easy and effective program updates, using development and programming tools. User can avail of the ELAN Writer to easily program his development code.
*Errata
Features
Operating voltage: 2.2V ~ 5.5V
Operating temperature: -40°C ~ 85°C
Product Info
Data Sheet
Package Outline
- DIP-14L
- SOP-14L
- DIP-16L
- SOP-16L
- DIP-18L
- SOP-18L
- DIP-20L
- SSOP-20L
Product Support
Supporting Tools
Supporting Documents
Supporting Tools/Doc Update
Contact Us

Figure 2-4c Accessing FWriter Tool under “Supporting Tool”

From the ensuing display, look for “FWTR” under **Tools** column. Then click, **File** button from the **Download** column of Item “**Software”** as illustrated below.



IC Part No.	Tools	Item	Version	Description	Download	Release Date
EM78M447	MTPWTR (8BIT)	Software	V1.4	Software for MTP Writer which supports WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP.	File	2005/3/2
		Setup Driver	V1.0	Setup printer port driver for WIN95, WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP.	File	2005/3/2
EM78F651N EM78F652N	FWTR	Software	V1.3	Software for FWTR which supports WIN95, WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP for EM78F651N/F652N	File	2007/6/1
		Setup Driver	V1.0	Setup printer port driver for WIN95, WIN98, Windows ME, Windows NT4.0, Windows2000 and Windows XP.	File	2006/9/20
EM78P153E EM78P156E EM78P447S	Window Simulator	Software	V1.0	Software window version simulator for EM78P153E/EM78P156E/EM78P447S	File	2005/3/2

Figure 2-4d Accessing FWriter Driver by Clicking the “File” Button

If this is the first time for you to install the FWriter software, you need to install the printer port driving program **Port95nt.exe** first before installing the main software. The printer driver is also accessible from Item **Setup Driver** as shown in the figure above. The same condition is also applicable to DWriter.

You will then be prompt to either open the "FWriter.exe" file and directly install the software on-line or save the file into your computer and install the driver locally.

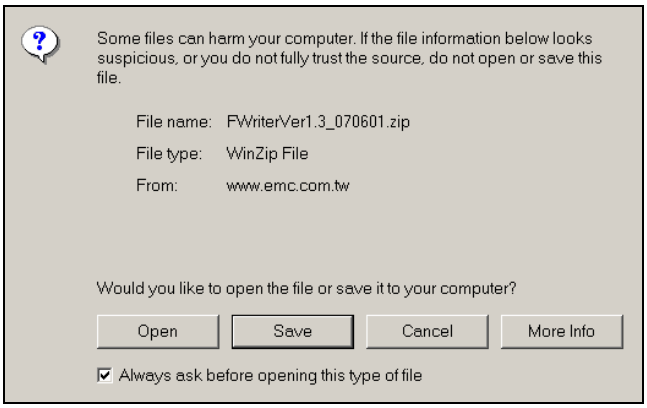

Some files can harm your computer. If the file information below looks suspicious, or you do not fully trust the source, do not open or save this file.
File name: FWriterVer1.3_070601.zip
File type: WinZip File
From: www.emc.com.tw
Would you like to open the file or save it to your computer?
Open
Save
Cancel
More Info
Always ask before opening this type of file

Figure 2-4e FWriter Installation Option Dialog

When the dialog at right appears, follow the instruction of the installer until the final dialog displays.

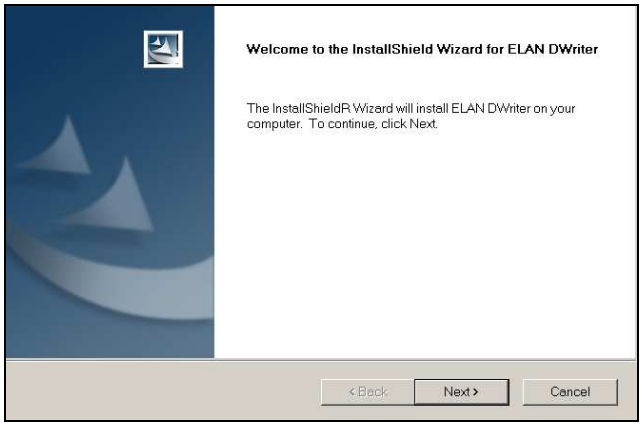

Welcome to the InstallShield Wizard for ELAN DWriter
The InstallShield® Wizard will install ELAN DWriter on your computer. To continue, click Next.
< Back
Next >
Cancel

Figure 2-4f FWriter Installation Process Welcoming Dialog

Note that at this stage, the host computer needs to reboot to complete the installation. If you choose to restart later, the message at right will appear.

Figure 2-4g FWriter System Driver Incomplete Installation Reminder

Chapter 3
Getting Started with DWriter/FWriter System

3.1 Applying Power to DWTR/FWTR Assembly

WARNING!!
The DWTR/FWriter executes a self-diagnostic for a few seconds after the power is supplied. To prevent damage to the OTP/FLASH chip, do NOT install chip on the Textool before the self-diagnostic is completed.

1. Mount the jumper to its appropriate position to match with the target OTP/FLASH chip in the jumper chamber of DWTR/FWriter back panel (see Fig 1-1b of Section 1.3 in Chapter 1).
2. With the DWTR/FWriter Assembly connected to host PC and free from /FLASH chip, plug the power adapter to power source. The LCM should activate to indicate power is on and self-diagnostic is being performed.

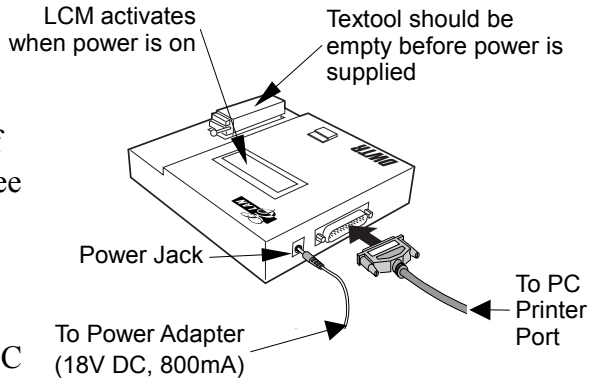

LCM activates when power is on
Textool should be empty before power is supplied
Power Jack
To PC Printer Port
To Power Adapter (18V DC, 800mA)

Figure 3-1 Connecting DWTR to PC and Power

3. Then install the OTP/FLASH chip on Textool as explained in Sections 1.2.3 and 2.2.2. Be sure the correct chip is installed for the correct jumper position as explained in Item 1 above.

3.2 Loading Source File to DWTR/FWTR Buffer (EEPROM)

1. Run the DWriter/FWriter driver by clicking the ELAN DWRITER icon from desktop. To run from Windows taskbar, click [**Start**] → [**ELAN DWRITER**] → [**ELAN DWRITER**]. The following initialization dialog will then display (Same process applies to FWTR).

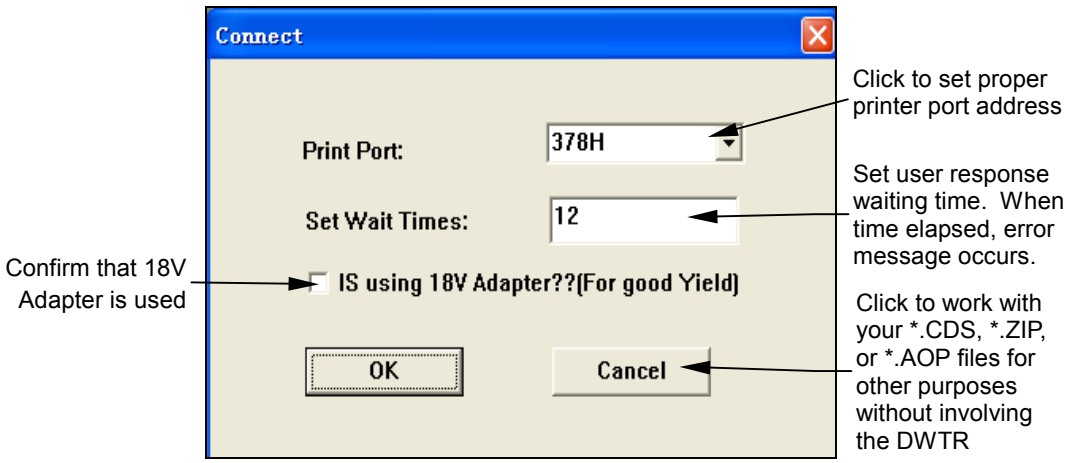

Connect
Print Port:
378H
Set Wait Times:
12
IS using 18V Adapter??(For good Yield)
OK
Cancel
Click to set proper printer port address
Set user response waiting time. When time elapsed, error message occurs.
Confirm that 18V Adapter is used
Click to work with your *.CDS, *.ZIP, or *.AOP files for other purposes without involving the DWTR

Figure 3-2a DWriter/FWriter Driver Initialization "Connect" Dialog

NOTE

*If you click the **Cancel** button, the following dialog will display the complete list of all supported ICs and allows you to select a target chip from the list. You can then work with your *.CDS, *.ZIP, or *.AOP files for other purposes without involving the DWTR/FWriter Assembly. This dialog will display with or without connecting your PC to DWTR/FWriter Assembly.*

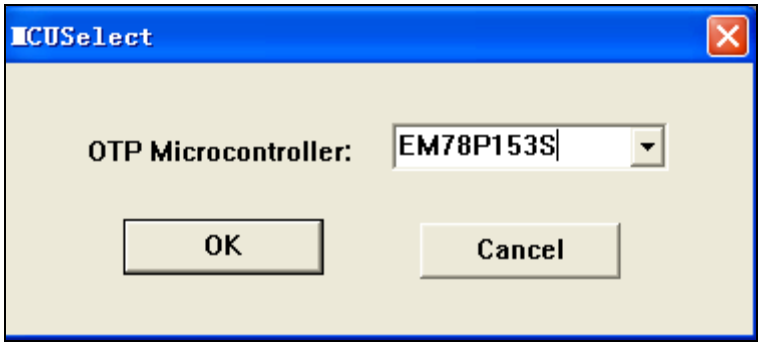


*Figure 3-2b DWriter/FWriter Driver "MCUSelect" Dialog when Working with *.CDS, *.ZIP, or AOP Files*

2. Define printer port and waiting time settings, then clicking **OK** button from the **Connect** dialog. When PC to DWTR/FWTR printer port connection is successful, the following **MCUSelet** (for DWTR) or **Connect (for FWTR)** dialog will display.

   If the error message; "*Error W0043: PC can not find print port*" occurs; try changing the printer port setting and check PC and DWTR/FWTR Assembly printer port connectors for possible loose connection.

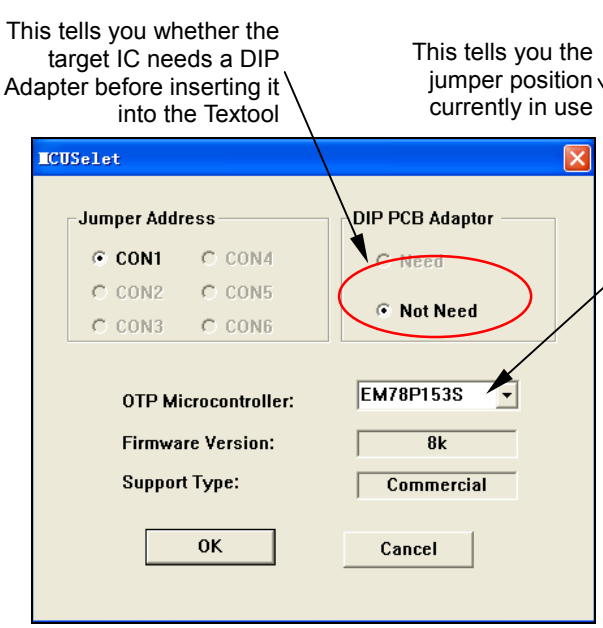


Figure 3-2c DWriter Driver "MCUSelect" Dialog Showing 8K Firmware

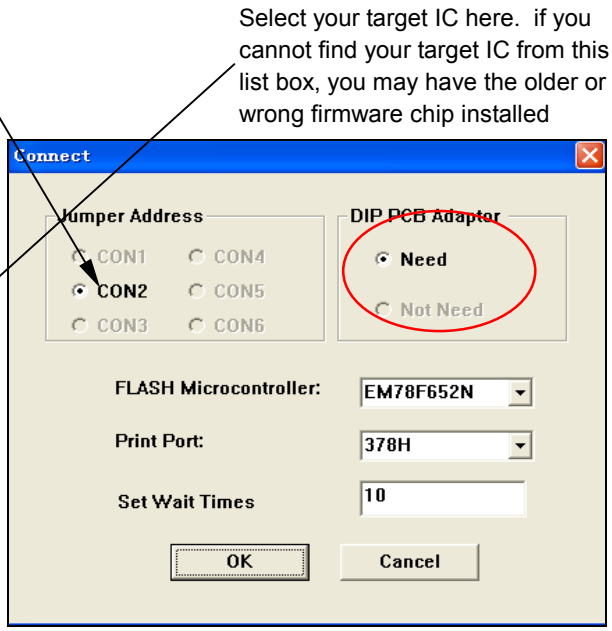


Figure 3-2d FWriter Driver "Connect" Dialog

■ For DWTR only

If the DWTR firmware chip installed is of older version, e.g., version "7k," the **OTP Microcontroller** list box will display fewer supported chips compared to DWTR Assembly equipped with version "8k" firmware chip.

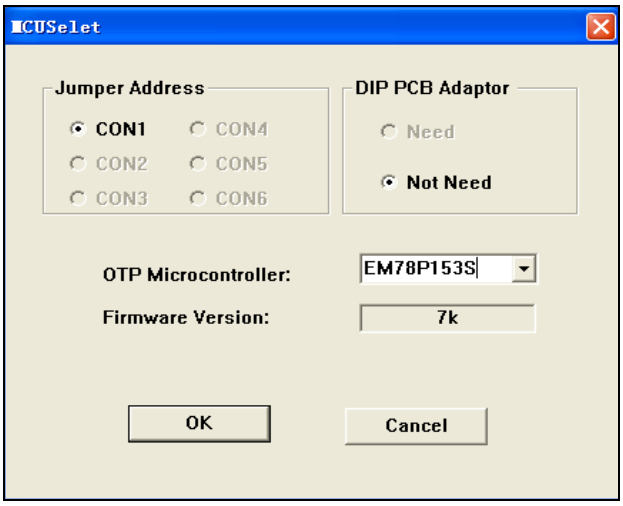


Figure 3-2e DWriter Driver "MCUSelect" Dialog with 7k Firmware

3. Click OK button when proper microcontroller setup is completed.

   The DWriter/FWriter driver then communicates with the DWTR/FWTR Assembly. If successful, "*EM78xxx connected*" will display in the title bar (see figure below). Otherwise "*EM78xxx not connected*" will display.

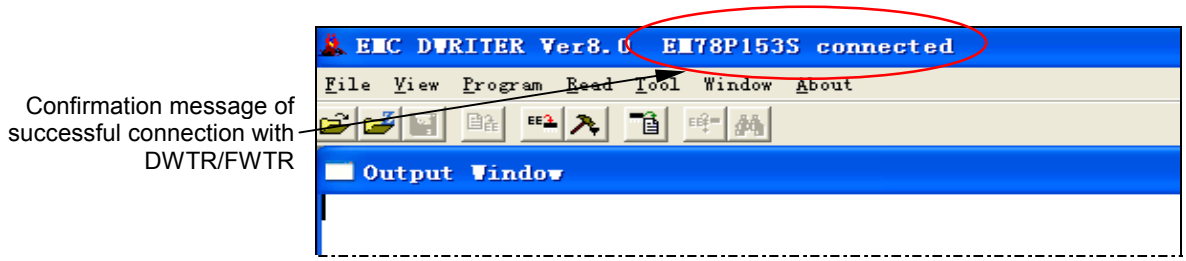

Confirmation message of successful connection with DWTR/FWTR
EMC DWRITER Ver8.0 EM78P153S connected
File View Program Read Tool Window About
Output Window

Figure 3-2f Title Bar Showing Successful Handshaking with DWTR/FWTR

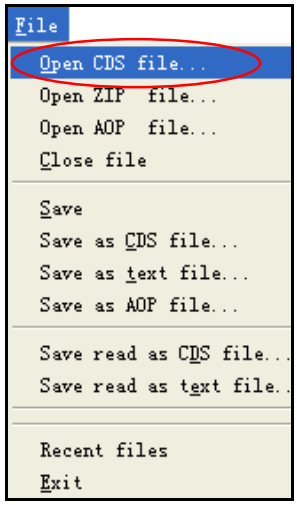


Figure 3-2g Open CDS File from File Menu

4. Click **Open CDS file…** command from **File** menu to open your CDS file. The **Source** file window and the **Code Option** dialog (below) will appear simultaneously.

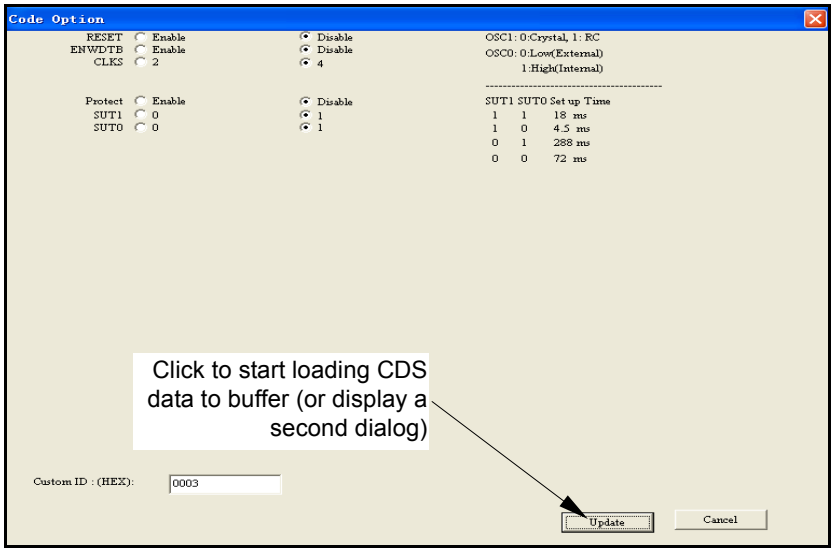
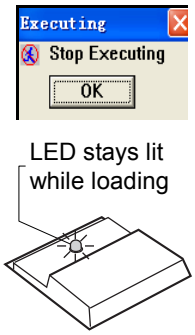


Figure 3-2h Dwriter Driver "Code Option" Dialog

5. With the Code Option dialog on display, you can arrange a suitable combination of options for the selected microcontroller. After selecting the options, click [Update] button and th DWriter starts loading the CDS data to the DWTR/FWTR buffer (EEPROM). Observe the Executing dialog appears at the top-left corner of the screen while the LED on DWTR/FWTR red button lights up and stays lit while loading is in progress.



However, for FLASH chips and OTP chips that are equipped with IRC mode feature, or one of the following**;**

EM78P152S	EM78P153E	EM78P153S	EM78P154N
EM78P155N	EM78P159N	EM78P211N	EM78P212N
EM78P221N	EM78P222N	EM78P256	N EM78P258N
EM78P259N	EM78P260N	EM78P330N	EM78P331N
EM78P340N	EM78P341N	EM78P342N	EM78P343N
EM78P345N	EM78P346N	EM78P347N	EM78P417N
EM78P418N	EM78P419N	EM78P5840N	EM78P5841N
EM78P5842N	EM78F651N*	EM78F652N*	

another dialog (shown at right) will display instead of **Code Option** after clicking the [**Update**] button. Select the appropriate oscillator mode and IRC frequency. Then click the [**OK**] button and loading of CDS data (plus the added options) to buffer starts. The **Executing** dialog appears.

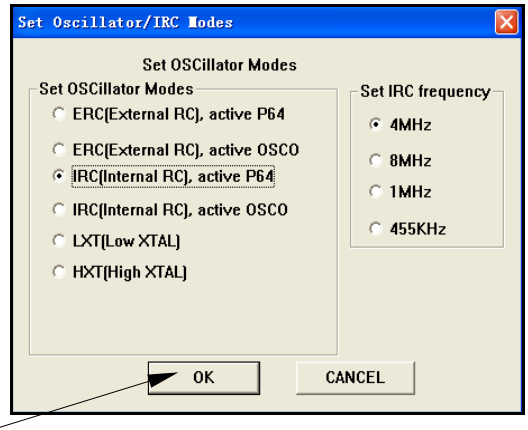


Figure 3-2i "Set Oscillator/IRC Modes" Dialog

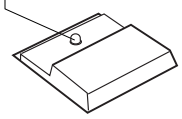
Click to start loading CDS data to buffer

To abort loading, click the [**OK**] button of the **Executing** dialog.

Click to abort loading of CDS data to buffer

Figure 3-2j Use "Executing" Dialog to Abort Loading Execution

LED turns-off when loading is completed



6 When loading is completed, the **Executing** dialog exits while the LED on DWTR/FWTR red button turns off.

NOTE

1. *Whenever loading of data to buffer is aborted, perform power reset to the DWTR/FWTR Assembly before resuming the loading activity.*
2. *When error occurs during loading, the red button LED will blink and error indication (X) will display from the LCM. Refer to Sections 1.2.1 and 1.2.2 in Chapter 1 for details on LCM and LED Indicators respectively.*
3. *With the error corrected without closing the CDS file, resume loading by clicking the **Load** command from the **Program** menu.*

* FLASH chips

7. To read and check the contents of the buffer, click the [**Read Buffer**] command from the **Read** menu. The **Read from Buffer** window (shown below) will display.

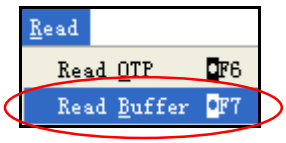


Figure 3-2k "Read" Menu

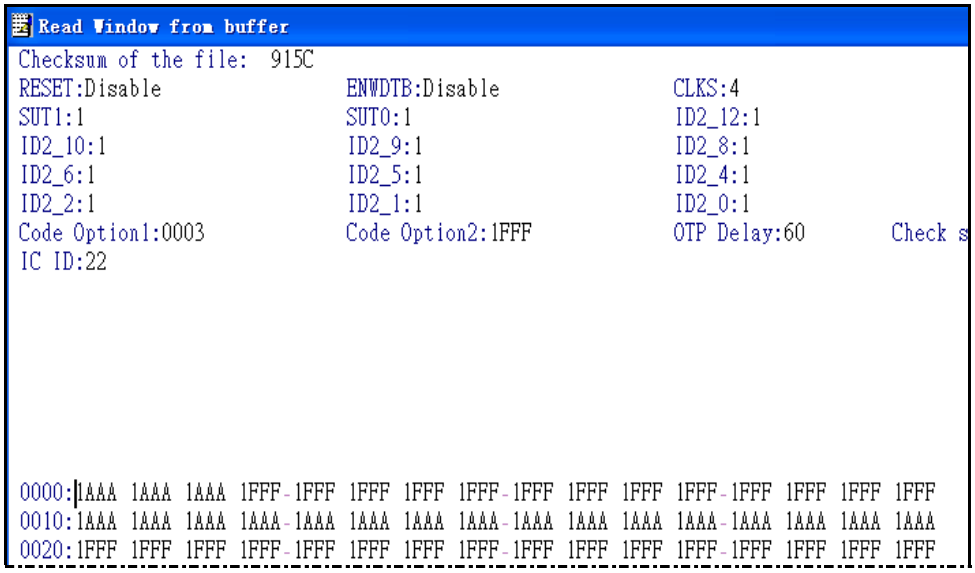

Read Window from buffer
Checksum of the file: 915C
RESET:Disable ENWDTB:Disable CLKS:4
SUT1:1 SUT0:1 ID2_12:1
ID2_10:1 ID2_9:1 ID2_8:1
ID2_6:1 ID2_5:1 ID2_4:1
ID2_2:1 ID2_1:1 ID2_0:1
Code Option1:0003 Code Option2:1FFF OTP Delay:60 Check s
IC ID:22
0000:1AAA 1AAA 1AAA 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF
0010:1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA 1AAA
0020:1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF

Figure 3-2l "Read from Buffer" Window

3.3 Saving CDS File with the Selected Code Option and IRC Values

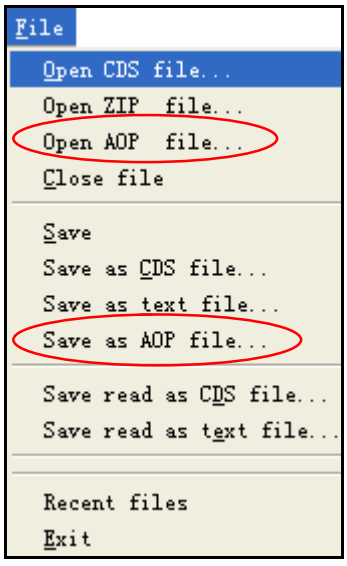


Figure 3-3 "File" Menu

To save the latest version of the CDS file after it has been incorporated with the selected code option (and IRC where applicable) values, click [**Save as AOP file…**] from the File menu. The AOP file is automatically saved with the added options in the same folder where your project is located.

The next time you want to use the same CDS file for loading into buffer, just click [**Open AOP file…**] and the CDS file, together with its previously defined options will be opened. You can then directly proceed to load the file to buffer without the hassle of redefining the options.

3.4 Programming of OTP/FLASH Chip on Textool

Once the source file is loaded into the buffer, DWriter System is ready to program the OTP chip with or without the host computer.

NOTE

When error occurs during programming, the red button LED will blink and error indication (X) will display from the LCM. Refer to Sections 1.2.1 and 1.2.2 in Chapter 1 for details on LCM and LED Indicators respectively.

3.4.1 Programming On-Line with Menu Command

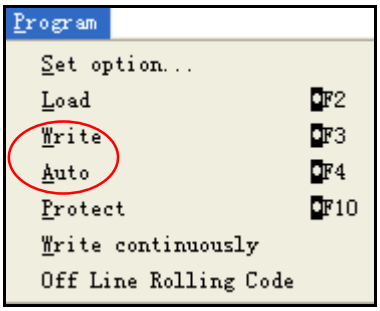
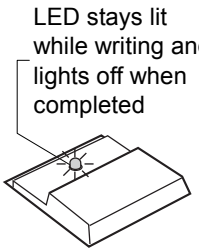


*Fig.3-4a **Program** Menu*

With the jumper position, buffer loading, and OTP/FLASH chip installation properly carried out, click [**Write**] or [**Auto**] command from the **Program** menu to start OTP/FLASH chip programming.

[**Write**] command starts programming of the OTP/FLASH chip on the Textool; then, read and compare the OTP/FLASH chip codes against the source file. The execution result is displayed on the **Output** window. Moreover, the internal frequency (if applicable) is momentarily displayed for about one second.



[**Auto**] command checks the jumper whether it is in the correct position and whether the OTP/FLASH chip on Textool is blank (writable) or not. If positive, it then executes the **Write** command. Otherwise it will display the error message**:** "*Error W036:The DWRITER is not READY!!!* ." Meanwhile, the LED on the red button should light up and stays lit while the buffer data is being written into the OTP/FLASH chip. It lights off when writing is successfully completed. Otherwise it slowly blinks (1.5 cycles/sec) if programming fails. The DWTR/FWTR will also sound an alarm (a beep) simultaneously.

Also observe the LCM display for possible error while programming is in progress.

To read and check the contents of the buffer after a successful programming, click the [**Read OTP**] (or [**Read FLASH**]) command from the **Read** menu. The **Read from OTP** (or **Read from FLASH)** window will display.

Remove the programmed chip and place another blank OTP/FLASH chip on the Textool, and repeat the procedure.

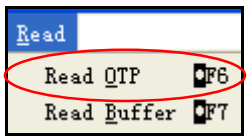


Figure 3-4b DWriter "Read" Menu

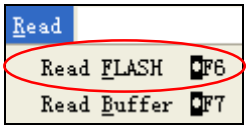
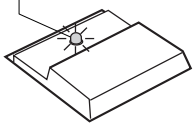


Figure 3-4c FWriter "Read" Menu

3.4.2 Stand-Alone Programming (Without PC)

NOTE
You may or may not disconnect DWTR/FWTR Assembly from PC to perform programming under stand-alone feature.



1. With the jumper position, buffer loading, and OTP/FLASH chip installation properly carried out, press the red button. The LED on the red button should lights up and stays lit while the buffer data is being written into the OTP/FLASH chip.
2. Observe the LCM display (at the area with of shaded blocks below) to monitor the progress of the OTP/FLASH chip programming.

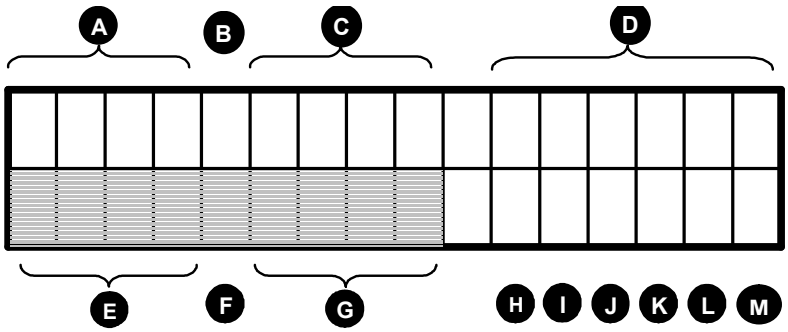


Figure 3-5a LCM Display under General Function

Where: **E)** OTP Checksum
F) OTP Code Option word number
G) OTP Code Option

3. Read the "**H**" block (shaded area) for Read/Programming results.

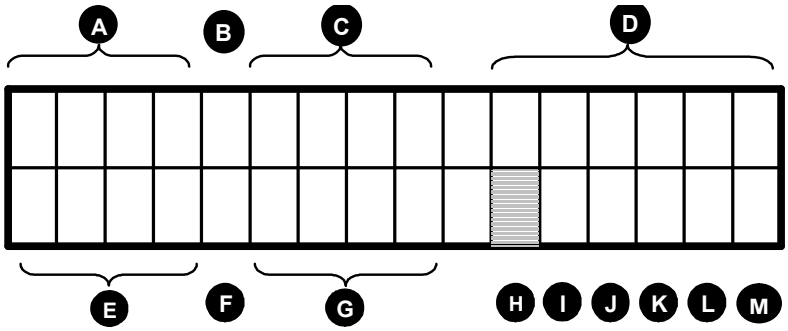


Figure 3-5b LCM Display under General Function

Read: Display "O" if reading is successful. If not, "**X**" is displayed

Program: If IC is not blank, display "**#.**" Display "**O**" if programming is successful. If not, "**X**" is displayed

The LED on red button also lights off when writing is successfully completed. Otherwise it slowly blinks (1.5 cycles/sec) if programming fails. The DWTR/FWTR will also sound an alarm (a beep) simultaneously.

4. Remove and place another blank OTP/FLASH chip on the textool, and repeat the procedure.

3.5 Performing a DWriter/FWriter System Test

You can perform a DWriter /FWriter System test a number of times to determine the capability and condition of the DWTR /FWTR Assembly under one of the test options offered in the **Writer Test** dialog. The test results are displayed in the **Output** window.

The dialog is derived by clicking the [**Writer Test…**] command from **Tool** menu.

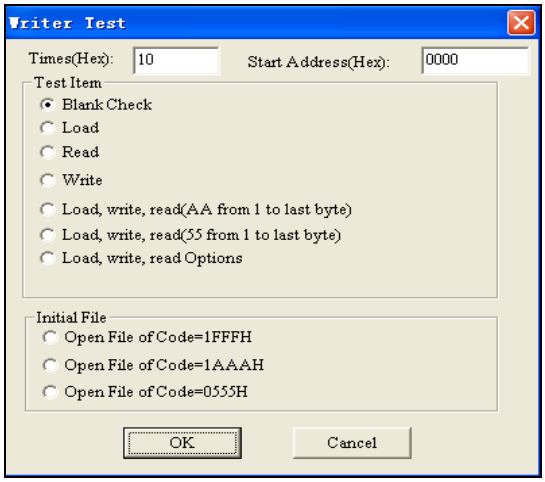


Figure 3-6a "Writer Test" Dialog

■ The **Test Item** command options are**:**

Blank Check: Check the OTP/FLASH chip "n" times to verify if it is programmable (blank). Otherwise, "*OTP code in not Blank*" will display.

Load: Load source file to buffer (EEPROM) and read results "n" times. It will confirm "*Reading from buffer is OK!!*" and "*Load Source to Buffer is Successful!!*" if both loading and reading are okay. Otherwise, "*Reading from buffer is in Error!!*" and/or "*Load Source to Buffer is in Error!!*" will display if both or either one is in error.

Read: Read source code from OTP/FLASH chip "n" times. It will confirm "*Reading from OTP is Successfu!!!*" if reading is okay. Otherwise, "*Read OTP is in Error!!*" will display.

Write: Write code "n" times from buffer (EEPROM) to OTP/FLASH chip. It will confirm "*Write buffer to OTP is successful!!*" if writing is okay. Otherwise "*Write buffer to OTP is in Error!!*" will display.

Load, Write, and Read (AA from 1 to last byte): Perform combined tasks of loading to & reading from buffer and writing to & reading from OTP/FLASH chip starting from the defined address until the defined total number "1AAA" words are written.

Load, Write, and Read (55 from 1 to last byte): Same as above, except that command execution ends until the defined total number "0555" words are written.

Load, Write, and Read Options: Perform combined tasks of loading to & reading from buffer and writing to & reading from OTP/FLASH chip with the code options included.

■ **Example:**

Selected test command: "Load, write, read (55from 1 to last byte)"

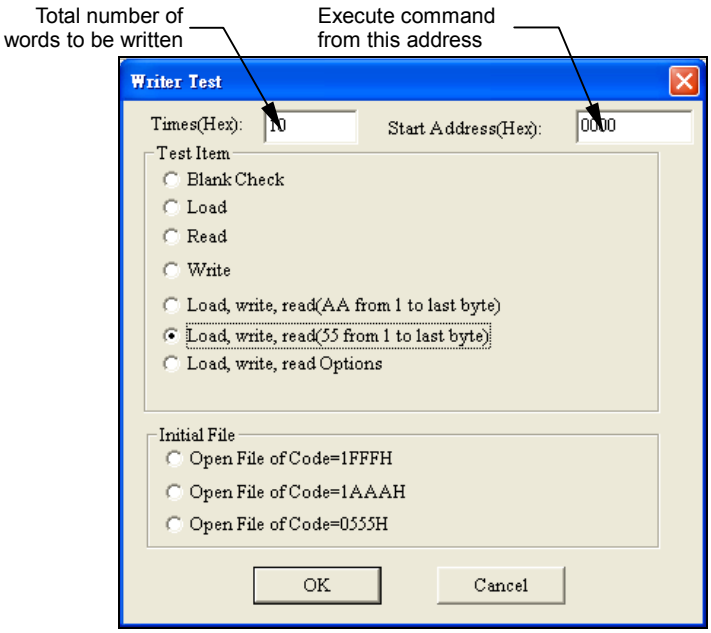


Figure 3-6b "Writer Test" Dialog with "Load,write,read(55…)" Selected

Result Example:

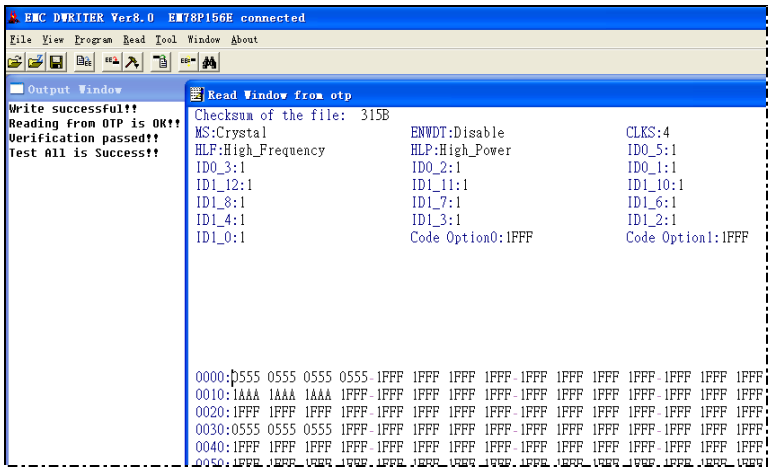

EMC DWRITER Ver8.0 EM78P156E connected
File View Program Read Tool Window About
Output Window
Write successful!!
Reading from OTP is OK!!
Verification passed!!
Test All is Success!!
Read Window from otp
Checksum of the file: 315B
MS:Crystal
ENWDT:Disable
CLKS:4
HLF:High_Frequency
HLP:High_Power
ID0_5:1
ID0_3:1
ID0_2:1
ID0_1:1
ID1_12:1
ID1_11:1
ID1_10:1
ID1_8:1
ID1_7:1
ID1_6:1
ID1_4:1
ID1_3:1
ID1_2:1
ID1_0:1
Code Option0:1FFF
Code Option1:1FFF
0000:0555 0555 0555 0555 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF
0010:1AAA 1AAA 1AAA 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF
0020:1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF
0030:0555 0555 0555 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF
0040:1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF 1FFF

Figure 3-6c DWriter Test Output Window

■ The **Initial File** command options are**:**

Open File of Code=1FFFH:
Open File of Code=1AAAH:
Open File of Code=0555H:

These commands can help you create a new CDS file from scratch with any of the three initial code values provided.

3.6 Programming a New Set of OTP/FLASH Chip

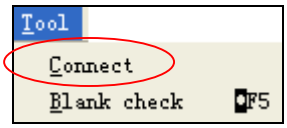


Fig.3-7a "Tool" Menu

When switching into another set OTP/FLASH target chip (with different part number), you need to start the whole procedure again. From the **Tool** menu, click on [**Connect**] command. The **MCUselect** (for DWTR) or **Connect** (for FWTR) dialog will then display.

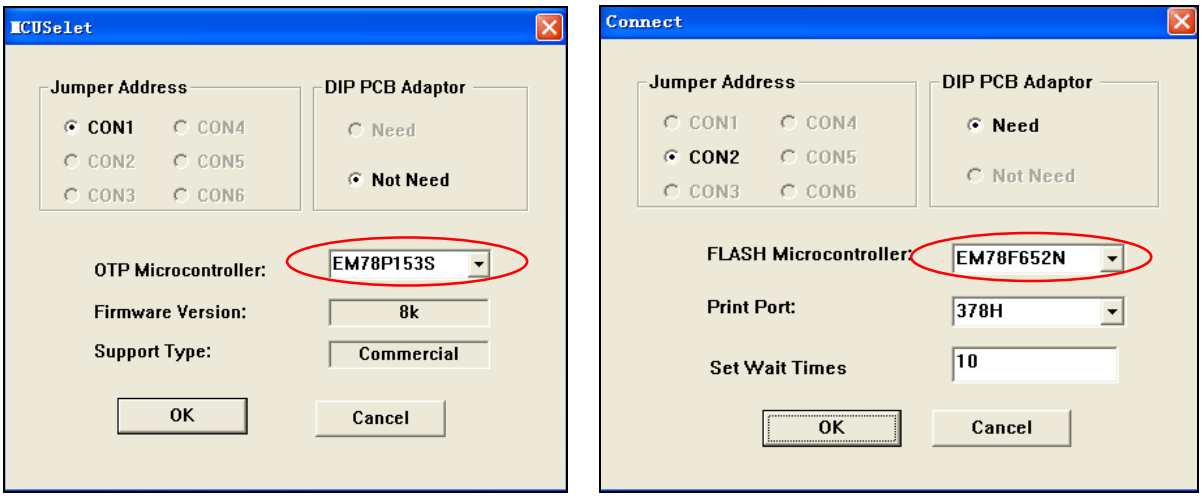


Figure 3-7b DWriter (L) & FWriter (R) Dialogs Display After Clicking "Connect" Command

Click the drop-down arrow on the **OTP Microcontroller** (for DWTR) or **FLASH Microcontroller** (for FWTR) combo box to define the new target OTP chip and open the pertinent CDS file. Repeat the steps described in Section 3.2, *Loading Source File to DWTR/FWTR Buffer (EEPROM).*

Previous data in the buffer will be overwritten when new data are loaded.

3.7 Erasing FLASH Chip Contents with FWTR

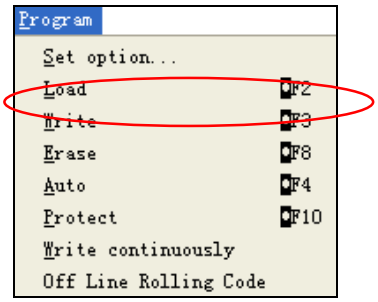


Fig.3-8 FWriter "Program" Menu

To erase existing contents of the FLASH chip mounted on the FWTR, click [**Erase**] command from the **Program** menu.

Appendix A
IRC Frequency Calibration

A.1 Introduction

This feature only applies to the OTO/FLASH equipped with IRC mode feature microcontrollers, or as follows:

EM78P152S	EM78P153E	EM78P153S	EM78P154N
EM78P155N	EM78P159N	EM78P211N	EM78P212N
EM78P221N	EM78P222N	EM78P256	N EM78P258N
EM78P259N	EM78P260N	EM78P330N	EM78P331N
EM78P340N	EM78P341N	EM78P342N	EM78P343N
EM78P345N	EM78P346N	EM78P347N	EM78P417N
EM78P418N	EM78P419N	EM78P5840N	EM78P5841N
EM78P5842N	EM78F651N*	EM78F652N*	

All the four main frequencies (1MHz, 4MHz, 8MHz, and 455kHz) can be calibrated through programming of the OPTION bits (CAL0, CAL1, and CAL2), e.g., if you choose 4MHz base-frequency under IRC mode, the DWTR/FWTR Assembly will automatically calibrate the IRC frequency to 4MHz through the OPTION bits. Take note that internal RC frequency drift do occur. Tolerance allowed for the drifts are explained in the following sections.

The DWTR/FWTR will sound an alarm (a beep) if the tolerance is exceeded after programming is completed. The chip has to be discarded.

A.2 Drift Tolerance for OTP EM78P153E/S

When programming EM78P153E/S OTP chips, the drift rate of ± **5%** is allowed when the defined frequency is 4MHz. For frequencies 1M, 8M, and 455kHz, the allowed drift rate is ± **10%**.

Example: Assuming that you choose 4MHz, the DWTR acceptable IRC frequency range is from 3.8MHz to 4.2MHz.

* FLASH chips

A.3 Drift Tolerance for Other IRC Chips

For the rest of the IRC chips frequency drift rate of **± 4%** is acceptable under all four main frequencies (1MHz, 4MHz, 8MHz, and 455kHz).

Appendix B
Frequently Asked Questions (FAQ)

Q: What is the maximum number of the function parameters?

A: It depends on the RAM bank size (about 32 or 31 bytes).

Q: How to check a failed buffer?

A: There are two ways to recognize the buffer has failed:

1. An error message is displayed on the Output window whenever the **Load** command is executed.
2. The LED on the SWTR Assembly red button keeps on blinking at fast interval (5 times per second) all the time. Blinking does not stop with repeated tapping of the red button.

Q: What is "High/Low Frequency Mode in the Code Option Dialog"?

A: If the application system is below 400 kHz, the low frequency must be selected. Otherwise, the high frequency is selected.

Q: What is "Code Protected"?

A: Once the protection function is enabled, the contents of the OTP ROM can no longer be read. The values displayed on the screen do not mean anything

Q: What are indications of each of the LED status?

A:
- **Stays on:** programming in progress. Wait for the LED to turn off
- **Off:** programming OK, reading OK, loading OK
- **Very slow blinking (1.5 cycles per second):** programming failed
- **Slow blinking (2.5 cycle per second):** OTP chip not in socket
- **Fast blinking (5 cycles per second):** programming buffer (EEPROM) reading failed

Q: How to update your DWriter System software?

A**:** Update the software by downloading the new software from the ELAN website as explained in Section 2.3.2, *Downloading DWriter from ELAN Website* of Chapter 2 of this manual.

You may also ask ELAN's representative in you area for the update if you experience problem in accessing the website.

Q: During programming operation, why does the H position of LCM display keep on showing "#" or "X"?

A: When "#" displays, it tells you that the OTP chip in use is not blank or has been programmed before, and cannot be programmed again.

"**X**" appears when DWTR can not detect any OTP chip on Textool. Either there is none installed or you forgot to lock the Textool socket tightly. If the problem continuous, contact FAE of ELAN.

Q: During programming of IRC OTP chips, the Output window displays the message; "the programming failed" or "the frequency is out of range." What is the difference between the two messages?

When "programming failed," the LED on DWTR red button will flash 1.5 times per second, and the buzzer will alarm at the same frequency. At the same time, the "H" position of LCM will display "**X.**"

When "frequency is out of range," the LED and buzzer alarms are the same with that of "programming failed," but the "H" position of LCM will display "**O.**"

Q: When a new DWTR is powered on, why do the LED flashes faster and the buzzer alarm sets off?

A: Because the EEPROM of the new DWTR is empty (no data) or has been inadvertently corrupted when connected on-line. When DWTR is powered on, it auto-detects the EEPROM status. You may ignore the alarms and continue to load the source file to EEPROM and then perform programming.

Appendix C
Programming Application Notes

C.1 Special Requirements of EM78P311, EM78P312, EM78P330, EM78P510, & EM78P809

When programming OTP chips that have 8K ROM (i.e., EM78P311, EM78P312, EM78P330, EM78P510, & EM78P809), the DWTR EEPROM must be replaced with 24LC256. Otherwise, connection will hang while displaying the **Checking connector** dialog (figure below) and the buzzer alarms.

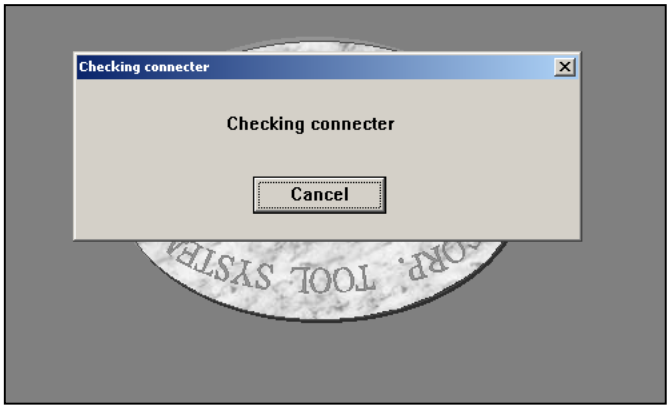


Figure C-1 "Checkign Connector" Dialog

C.2 Cannot Identify ELAN Chip ID

When DWTR cannot authentically identify the ICID of the target chip, the following dialog will display. Please contact FAE of ELAN when this condition occurs.

Figure C-2 Error Message When Target IC Cannot be Identified

C.3 Code Option and ROM Data All Read "0"

During on-line programming, when the **READ** window shows all code option and ROM data values are all "0" (see figure below), you could be using the old version of chip EM78P5840N, EM78P5841N, EM78P5842N, or EM78P510N. When this occurs, please contact FAE of ELAN.

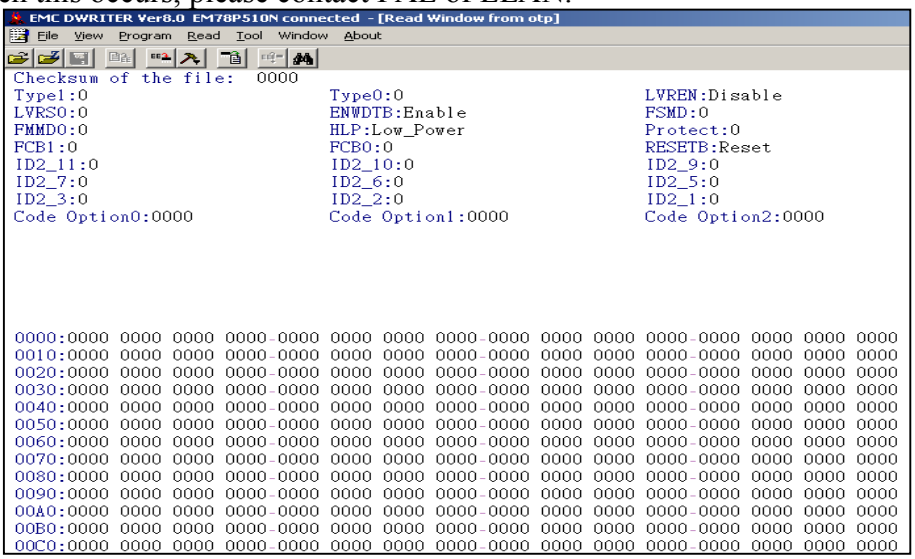


Figure C-3 "READ" Window Showing All Code Option and ROM Data Values = "0"

C.4 Programming SOP or SSOP Package Chips

When programming ICs with SOP or SSOP package, ensure that all contact points between chip and adapter, as well as between adapter and DWTR are solidly connected. If failure persists after 5 tries, change the adapter or the Textool with a new one. If the problem still exists please contact FAE of ELAN.

Appendix D
Supported OTP/FLASH Microcontrollers

The DWTR/FWTR Assembly supported OTP/FLASH chips are listed below. The OTP chips are categorized into two groups, “industrial” and “commercial” grade. The “industrial” grade ICs require the 8K Industrial firmware chip, while the “commercial” group ICs require the 8K Commercial firmware chip.

D.1 “Industrial” Grade OTP Chips

These “industrial” (OTP) microcontrollers are supported with 8K Industrial firmware chip:

EM78P154N	EM78P155N	EM78P156N*	EM78P157N*
EM78P159N	EM78P256N	EM78P258N	EM78P259N
EM78P260N	EM78P340N	EM78P341N	EM78P342N
EM78P343N	EM78P345N	EM78P346N	EM78P347N
EM78P211N	EM78P212N	EM78P221N	EM78P222N
EM78P311N	EM78P312N	EM78P330N	EM78P331N
EM78P4I7N	EM78P418N	EM78P419N	EM78P447N*
EM78P468N*	EM78P468L*	EM78P510N	EM78P5840
EM78P5840N	EM78P5841	EM78P5841N	EM78P5842
EM78P5842N	EM78P809N		

D.2 “Commercial” Grade OTP Chips

These “commercial” (OTP) microcontrollers are supported with [2]8K Commercial firmware chip:

EM78P152S	EM78P153S	EM78P153E	EM78P156E
EM78P156N*	EM78P157N*	EM78P257	EM78P447N*
EM78P447S	EM78P451	EM78P451S	EM78P458
EM78P459	EM78P468N*	EM78P468L*	

* These chips are supported by both “industrial” and “commercial” grades firmware.

D.3 FLASH Chips

The FLASH ICs require the “FWTR2.0” firmware chip. The following are the FWTR supported microcontrollers**:**

EM78F651N EM78F652N

More supported chips will be added in the future.